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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NOBUHIRO NISHIYAMA
and KENICHI KURITA

Appeal 2009-004595
Application 10/695,001
Technology Center 2800

Decided: September 30, 2009

Before EDWARD C. KIMLIN, BRADLEY R. GARRIS, and
MARK NAGUMO, *Administrative Patent Judges.*

NAGUMO, *Administrative Patent Judge.*

DECISION ON APPEAL

A. Introduction[1]

Nobuhiro Nishiyama and Kenichi Kurita ("Nishiyama") timely appeal under 35 U.S.C. § 134(a) from the final rejection[2] of claims 1-10, 13, and 14.[3] We have jurisdiction under 35 U.S.C. § 6. We REVERSE.

The subject matter on appeal relates to semiconductor laser assemblies designed to accommodate high power laser diodes that require high levels of heat dissipation and that are easy to produce.

Representative Claim 1 is reproduced from the Claims Appendix to the Principal Brief on Appeal, annotated with labels to Figures 1A and 1B, which are reproduced infra at 7:

1. A semiconductor laser assembly comprising:

a substrate [10] including a first mount surface [10a] and a second mount surface [10b];

a submount [3] *mounted on the first mount surface* [10a] *of the substrate*;

a laser diode [1] mounted on the submount [3] and having at least one light emission point [13b] and an electrode; and

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[1] Application 10/695,001, *Semiconductor Laser Assembly*, filed 29 October 2003, claiming the benefit under 35 U.S.C. § 119(a) of Japanese Application 2002-313970, filed 29 October 2002. The specification is referred to as the "001 Specification," and is cited as "Spec." The real party in interest is listed as Sharp Kabushiki Kaisha. (Appeal Brief, filed 24 October 2007 ("Br."), 2.)

[2] Office action mailed 9 March 2007 ("Final Rejection"; cited as "FR").

[3] Claims 11 and 12, the only other pending claims, have been objected to and are not before us.

a monitoring photodiode [4]
mounted on the second mount surface [10b] of the substrate and having
a light-receiving surface [6] which receives light emitted from the light emission point [13b], and
a relay electrode [4a] *connected to the electrode of the laser diode* [1] *by a metal wire* [5a].

(Claims App., Br. 8; bracketed labels from Figs. 1A and 1B, indentation, and paragraphing added.)

The Examiner has maintained the following grounds of rejection:[4]

A. Claims 1-6 stand rejected under 35 U.S.C. § 102(b) in view of Lebby.[5]

B. Claims 7-10 stand rejected under 35 U.S.C. § 103(a) in view of Lebby.

C. Claims 13 and 14 stand rejected under 35 U.S.C. § 103(a) in view of Lebby and admitted prior art (Figure 7a).

Nishiyama contends that the Examiner erred in finding that the semiconductor laser assemblies taught by Lebby meet all the limitations of claim 1. First, according to Nishiyama, Lebby does not teach or suggest a submount under laser 14. Rather, laser 14 is a two-layered structure that is mounted on chip 13. (Br. 4-5.) Second, Nishiyama argues that Lebby does not teach a relay electrode.

[4] Examiner's Answer mailed 20 December 2007. ("Ans.").

[5] Michael S. Lebby et al., *Semiconductor Laser Package with Power Monitoring System and Optical Element*, U.S. Patent 5,838,703 (1998).

The Examiner maintains that Lebby Figure 1 shows a laser diode 14 on a submount that is mounted on substrate 13. (Ans. 7.) The Examiner maintains further that Lebby describes a metal wire 26 connecting the laser diode 14 to photodiode 16, and that "as VCSEL/laser diode place/mount/weld on the submount/circuit plate, the laser diode is weld/mount on to the relay-electrode so that power/current/source can be transmitted to the laser-diode. Without having 'metal-wire' connect to 'relay electrode' to transmit power/source to the 'laser-diode's electrode' the laser is non-operational." (Ans. 8.)

B. Findings of Fact

Findings of fact throughout this Opinion are supported by a preponderance of the evidence of record.

The 001 Specification

1. According to the 001 Specification, a semiconductor laser assembly is provided for a high-power laser diode that requires much heat dissipation and that is easily produced. (Spec. 4-5, ¶ [0013].)

2. Figures 6A and 6B, shown below:

Fig.6A
PRIOR ART

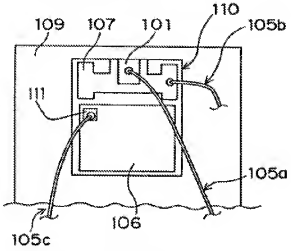
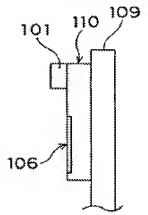


Fig.6B
PRIOR ART



{Fig. 6A, top view Fig. 6B, side view
{Prior art diode laser assembly}

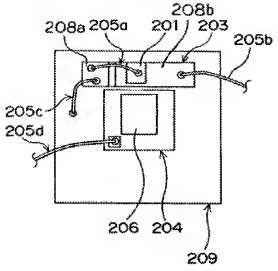
illustrate a prior art structure in which the laser diode 101 and a monitoring region 106 are provided on the same silicon submount 110. (Spec. 3, ¶ [0007]; for clarity, all element numbers are bolded throughout this opinion, regardless of how they appear in the original documents.)

3. Such assemblies, however, are said to have the problem that the silicon substrate 110 that serves as the common submount does not provide sufficient heat dissipation. (Spec. 3, ¶ [0008].)

4. Moreover, a relatively long wire 105a from the top of laser diode 101 must be connected to substrate 109, which is said to impair workability and reliability in the wire connection. (Spec. 4, ¶ [0011].)

5. On the other hand, Figures 7A and 7B, shown below,

Fig.7A
PRIOR ART



{Fig. 7A, top view

Fig.7B
PRIOR ART

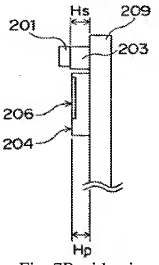


Fig. 7B, side view

{Prior art diode laser assembly}

illustrate another prior art structure that provides laser diode 201 and monitoring photodiode 204 separate from one another, which permits higher heat conductivity materials to be used for the submount 203 under laser diode 201. (Spec. 3, ¶ [0009].)

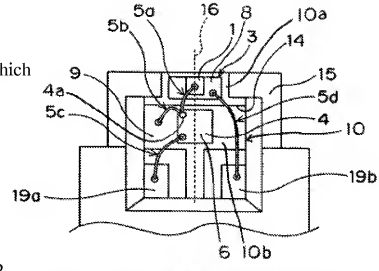
6. The laser assembly shown in Figs. 7A and 7B, however, is said to require delicate relative thickness adjustments of the submount 203 relative to the photodiode 204, which makes fabrication and production more difficult. (Spec. 3-4, ¶¶ [0010].)

7. In place of long wire 105a, the connection between the top of laser diode 201 to lead frame 209 may be "relayed" via electrode 208a on submount 203, thus reducing the height difference between the ends of wires 205a and 205c. (Spec. 2, ¶ [0004] and 4, ¶ [0012].)

8. However, according to the 001 Specification, the electrode formed on submount 203 must be divided into two electrodes, 208a and 208b, which complicates the production process. (Spec. 4, ¶ [0012].)

9. The 001 Specification describes a laser assembly, illustrated in Figures 1A (top view) and 1B (side view), shown right, that is said to overcome these problems.

Fig.1A



{Figure 1 is said to show a laser assembly}

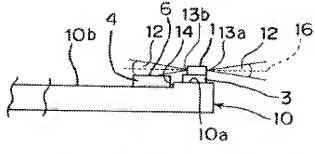
10. The laser assembly comprises a substrate 10 having a first mount surface 10a, on which is disposed submount 3, bearing laser diode 1, which emits light at points 13a and 13b. (Spec. 12, ¶ [0050].)

11. Light from emission point 13b strikes monitoring photodiode 6, which is mounted on second mount surface 10b. (Spec. 12, ¶ [0051].)

12. Wire 5a connects an upper electrode (not shown) on laser diode 1, to relay electrode 4a on photodiode 6. (Spec. 13, ¶ [0052].)

13. Wire 5b connects relay electrode 4a to upper surface 9 of metal lead 10a. (Spec. 13, ¶ [0052].)

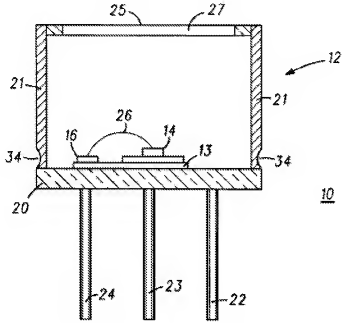
Fig.1B



{Figure 2 is said to show a laser assembly}

Lebby

14. Lebby describes a semiconductor laser package including a vertical cavity surface emitting laser ("VCSEL") (Lebby, col. 2, ll. 22-26), which is illustrated in Figure 1, the bottom relevant half of which is shown below:



{Figure 1 is said to show a VCSEL laser assembly}

15. Semiconductor laser package 10 is composed of a mounting structure 12, which is said to be fabricated as a "typical TO-can type structure." (Lebby, col. 3, ll. 25-28.)

16. Enclosed within mounting structure 12 is laser chip 13, which bears vertical cavity surface emitting laser (VCSEL) 14 and power monitoring diode 16. (Lebby, col. 3, ll. 28-31.)

17. According to Lebby, VCSEL 14 is formed from a first stack of distributed Bragg reflectors, an active region, and a second stack of Bragg reflectors. (Lebby, col. 3, ll. 31-39.)

18. When the second stack of distributed Bragg reflectors has been grown, e.g., by epitaxial deposition, it is patterned to form a ridge. (Lebby, col. 3, ll. 55-57.)

19. According to Lebby, photodiode 16 may then be fabricated either as an integrally formed photodectector or as a separate device, on the same or a different substrate. (Lebby, col. 4, ll. 3-9.)

20. In Lebby's words, "[a] plurality of wire bond interconnects 26, or similar interconnections, serve to electrically interface VCSEL 14 and photodetector 16 with metal leads 23 and 24." (Lebby, col. 5, ll. 22-24.)

21. Lebby does not appear to further characterize electrical connections between the various components of the semiconductor laser package.

C. Discussion

As the Appellant, Nishiyama bears the procedural burden of showing harmful error in the Examiner's rejections. *See, e.g., Gechter v. Davidson*, 116 F.3d 1454, 1460 (Fed. Cir. 1997) ("[W]e expect that the Board's anticipation analysis be conducted on a limitation by limitation basis, with specific fact findings for each *contested* limitation and satisfactory explanations for such findings.") (emphasis added).

As Nishiyama points out (Br. 4), Lebby describes the VCSEL as being formed from a stack of distributed Bragg reflectors that is patterned to from a ridge, which overlies an active region and another stack of distributed Bragg reflectors (Lebby, col. 3, ll. 35-57). Thus, Nishiyama's description of element 14 in Figure 1 as denoting a two-layer structure comprising a ridge and a lower layer is apt. Moreover, as is known in the art and as illustrated

by the 001 Specification, the term "submount" refers to a heat-dissipating structure to which a component, such as a laser diode, is attached. (Spec. 3, ¶¶ [0008]-[0009]; 5, ¶¶ [0016]-[0017].) The Examiner has not directed our attention to any credible evidence that a person having skill in the relevant arts would refer to an active portion of a laser diode as a "submount." In summary, the Examiner's identification of the lower layer as a "submount" is not supported by any credible evidence of record. This error is sufficient to REVERSE the rejection for anticipation.

Moreover, we do not understand Nishiyama to dispute (Br. 5-6) that Lebby Figure 1 shows an electrical connection between laser diode 14 and monitoring photodiode 16 or that there is an electrode on each of the two components. But we agree with Nishiyama that the Examiner has not shown that the electrode on photodiode 16, which is connected to the electrode of the laser diode 14 by a metal wire, is a relay electrode in the sense described in the 001 Specification. This error is also sufficient to REVERSE the rejection for anticipation.

As the Examiner's remaining rejections address other limitations of the dependent claims, they do not cure the missing submount and relay-electrode limitations.

D. Order

We REVERSE the rejection of claims 1-6 under 35 U.S.C. § 102(b) in view of Lebby.

We REVERSE the rejection of claims 7-10 under 35 U.S.C. § 103(a) in view of Lebby.

We REVERSE the rejection of claims 13 and 14 under 35 U.S.C. § 103(a) in view of Lebby and admitted prior art (Figure 7a).

REVERSED

sld

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